Fortunately one case has been studied which is not thus complicated, *i. e.*, the arc in mercury vapor between mercury terminals. In this case only one element is to be considered, and here Arons * found that the greater fall of potential was at the anode. In the light of the work now described we may interpret this to mean that the positive ions in such an arc move the more rapidly.

Warburg † found that in case of discharge in a vacuum tube containing some mercury vapor the fall of potential at the cathode was approximately the same as it was in nitrogen. Arons in discussing this calls attention to the fact that when discharge is taking place through a gas the greater fall of potential is at the cathode, when through a metal vapor at the anode. Possibly we may now modify this statement and say that when *gases are ionized the negative ions move the more rapidly, but that when metal vapors are ionized the positive ions move the more rapidly.* All the facts that have thus far been observed could be explained by such a hypothesis. If this should be shown to be correct, it will no doubt lead us to modify somewhat our ideas concerning the relation of metals to electricity.

C. D. CHILD.

* *Wied. Ann.*, 58, 78.

† *Wied. Ann.*, 40, 10.

MODULUS OF CONSTANT CROSS SECTION.

THE longitudinal rigidity of a solid, represented by Young's modulus, depending as it does upon both the volume elasticity and simple rigidity, leaves one condition unprovided for *viz.:* the case of longitudinal extension with cross section remaining unchanged. This case probably does not occur with an unrestricted stress, but it is easily conceived in theory. I can find no mention anywhere of a modulus of constant cross section, and have undertaken to approach the problem in this wise. Add to Young's modulus that fraction of the simple rigidity represented by Poisson's ratio. This preserves the longitudinal rigidity and restores to the new modulus the numerical measure of that portion of the strain called out by the change in lateral dimensions.

If this be a true modulus, it offers an easy method of determining approximately the mechanical equivalent of heat, and provides a practical experiment for laboratories not supplied with costly and complete apparatus. Thus a brass wire of density 8.5; sp. heat, of .09, coefficient of expansion .000018, volume elasticity 10×10^{11}, simple rigidity 3.7×10^{11}, and Young's modulus 10.4×10^{11} gives roughly,

$$\frac{\left[10.4 \times 10^{11} + \left(\frac{22.6}{67.4} \times 3.7 \times 10^{11}\right)\right]\frac{1}{2} \times .000018}{\frac{8.5 \times .09}{3}}$$

$$= 4.1 + \times 10^{7}$$

as the value of the calorie in C. G. S. units.

BENJ. H. BROWN.

NOTES ON INORGANIC CHEMISTRY.

WITHIN the past few years much has been added to our knowledge of the chemistry of the alums. To the aluminum, chromium, iron, gallium, and indium alums have been added those of titanium, vanadium, manganese, and cobalt. This completed the series of alums of the metals of the period from titanium to cobalt, but beyond this no alums were known of metals outside of the third group. In the last number of the *Zeitschrift für anorganische Chemie* Professor Piccini of Florence, the discoverer of the titanium and vanadium alums, has described a series of rhodium alums, including those of potassium, ammonium, rubidium, cesium and thallium. This is of peculiar interest, since rhodium belongs to a period in which no alums have been known, and opens the question as to whether there may be other alums in the same period, which includes molybdenum and columbium. Piccini is at present endeavoring to form iridium alums, which the preparation of the rhodium alums makes seem possible.

IN a paper in the last *Berichte* of the German Chemical Society, on radio-active lead, Professor K. A. Hofmann of Munich and Eduard Strauss describe two new substances which appear to be new chemical elements. Both are found in the lead chlorid obtained from pitchblende, and are separated from the lead by fractional crystallization. The one substance possesses no radio-activity and resembles some-